

REMARKS

Claims 1-8 have been examined.

Claim Rejections under 35 U.S.C. § 102(b)

The Examiner has rejected claims 1-8 under 35 U.S.C. § 102(b) as being anticipated by Watanabe et al. (U.S. Patent 5,597,223, hereinafter "Watanabe"). For the following reasons, Applicant traverses these rejections.

Watanabe relates to a display apparatus including a scattering type liquid crystal panel 108 driven by a modulating device driver 107. The modulated light from the scattering type liquid crystal panel 108 is incident on the projection lenses 110 through the field lens 109. The display apparatus includes an electric aperture stop 111 that narrows the bundles of rays projected from the projection lenses 110. The electric aperture stop 111 has an internal servo motor M which is controlled by a controller 120. The aperture size, i.e., the shape of the aperture of the aperture stop 111 is adjusted by the action of the servo motor. The controller 120 operates the aperture stop 111 on the basis of an input signal A from a luminescent signal smoothing circuit 140 and an input signal B from a decoder 121, thereby controlling the distribution of the incident light beam to the scattering type liquid crystal panel 108 and the exit beam angle range which contributes to a display. (See col. 11, line 44, to col. 12, line 18.)

Regarding claim 1, Applicant's invention relates a new and unique combination of elements that defines a device for enhancing contrast for a liquid crystal display projection system. Claim 1 recites, *inter alia*, "a contrast control portion" for controlling an amount of scanned light according to the brightness of a corresponding image.

As shown in Figure 2, a contrast control plate 22 receives collimated light from the liquid crystal display 15. The second polarizing plate 17 disposed between the LCD panel 22 and the focusing lens 18 selectively transmits or blocks the light scanned from the LCD panel 15, according to the polarizing component of the light. Since the contrast of the LCD panel is low and the polarizing plate disposed between the LCD panel and the projection lens does not block the light completely, the contrast control plate 22 is used together with the second polarizing plate 17 to block perfectly the light corresponding to the black level, thereby enhancing the contrast of the image. Applicant preferably uses an additional LCD panel as the contrast control plate 22. In addition, Applicant controls the degree of opening and closing of the cells constituting the LCD panel according to the level of the applied contrast control signal. Thus, Applicant selectively opens and closes the optical cells of the contrast control plate 22, or LCD, in order to block selectively light having passed through the LCD panel 15, at individual optical cells.

In contrast, Watanabe discloses an electric aperture stop unit 111 having an aperture with a variable size that limits a bundle of rays to be incident on the projection optical system from the modulating device. In addition, Watanabe discloses a display controller 121 that determines an optical angle of collection by which the contrast is a maximum and designates this optimum angle of collection to the aperture stop driver 123. The aperture stop driver 123 drives the electric aperture stop 111 to have the optimum angle of collection.

Thus, Watanabe discloses controlling the angle of collection using the electric aperture stops 111. Watanabe neither discloses nor suggests a contrast control portion as defined by Applicant and claimed in Applicant's claim 1.

Claim Rejections under 35 U.S.C. §103(a)

The Examiner has rejected claims 2-8 under 35 U.S.C. § 103(a) as being unpatentable over Watanabe in view of Tokui (U.S. Patent 5,231,456). For the following reasons, Applicant traverses these rejections.

Applicant submits that Tokui does not make up for the deficiencies of Watanabe, as applied to Applicant's independent claim 1. Thus, claims 2-8, which depend from claim 1, are also patentable over Watanabe and Tokui, either alone or in combination, at least by virtue of their dependency from Applicant's independent claim 1, and therefore, the rejections of these claims also should be withdrawn.

In addition, Applicant respectfully submits that the Examiner is mischaracterizing Applicant's dependent claims. In particular, the Examiner asserts that claim 3 differs from claim 2 only by the additional limitation "a contrast plate ... from said LCD panel". Furthermore, the Examiner asserts that claims 4 and 5 have substantially the same limitations as claims 1 and 2. Moreover, the Examiner asserts that claims 7 and 8 have substantially the same limitations as Applicant's claims 2 and 3.

Therefore, Applicant respectfully submits that the Examiner has interpreted Applicant's dependent claims incorrectly and that each of Applicant's dependent claims should have been considered separately by the Examiner based on each of the recitations recited therein.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No. 09/628,168

Claim Amendments

In addition, Applicant has amended claims 1 and 3 to correct minor informalities. Further, Applicant has amended claims 5 and 7 to depend properly from claim 3, which provides antecedent basis for the contrast controller and the contrast control plate recited in Applicant's claims 5 and 7.

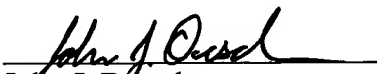
Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned attorney at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims are amended as follows:

1. (Amended) A device for enhancing contrast for a liquid crystal display (LCD) projection system, the contrast enhancing device comprising:
 - an image driver supplying an image signal;
 - [a] an LCD panel for converting the input image signal into an optical image signal; and
 - a contrast control portion positioned on the same optical axis as that of the LCD panel, for controlling an amount of scanned light according to the brightness of a corresponding image.

3. (Amended) The contrast enhancing device of claim 2, wherein said contrast control portion comprises:
 - a contrast control plate for controlling an amount of light scanned from said LCD panel;
 - and
 - a contrast controller for generating a contrast control signal for controlling the degree of the opening and closing of said contrast control plate according to the ABL control signal.

5. (Amended) The contrast enhancing device of claim [2] 3, wherein said contrast control plate is [a] an LCD.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No. 09/628,168

7. (Amended) The contrast enhancing device of claim [2] 3, wherein said contrast controller applies the contrast control signal for controlling said contrast control plate to be closed in correspondence to a difference value if the average level of the image signal is lower than the reference level, or controlling said contrast control plate to be opened in correspondence to a difference value if the average level of the image signal is higher than the reference level.